

Appl. No. : 10/074,564
Filed : February 11, 2002

REMARKS

Amendments to the Claims

Applicants respectfully request entry of the Amendments to the Claims set forth above. Claims 1 and 27 have been amended to recite a substrate having a surface area of about 300 cm² or greater. This amendment is supported in the specification at, e.g., paragraph [0090]. Claims 51-54 have been cancelled as being directed to a non-elected invention and Claims 47-50 have been withdrawn as being directed to a non-elected species. New Claims 55-80 are versions of original Claims 10-19, 22-26, 31, 32, 37-41, and 43-46, respectively, that have been rewritten in independent form to include the limitations of the base claims. Applicants respectfully submit that entry of the instant Amendment to the Claims is proper because all of the changes to the claims are supported in the specification and thus there is no issue of new matter.

Applicants reserve the right to file divisional and/or continuation applications containing claims directed to all or part of the subject matter of any claims amended, withdrawn, or canceled at any time during the prosecution of this application, and thus unclaimed subject matter is not dedicated to the public.

Summary of Telephonic Interview

Applicants thank the Office for the courtesies extended to the undersigned during the telephonic interview between the Examiner and the undersigned on November 12, 2003. A summary of that interview is set forth above.

Allowable Subject Matter

The Office objects to Claims 10-19, 22-26, 31, 32, 37-41, and 43-46 as being dependent upon a rejected base claim, but indicates that these claims would be allowable if rewritten in independent form to include the limitations of the base claim and any intervening claims. Applicants respectfully submit that new Claims 55-80 are versions of original Claims 10-19, 22-26, 31, 32, 37-41, and 43-46, respectively, that have been rewritten in the manner suggested by the Office. Therefore, Applicants respectfully request allowance of new Claims 55-80.

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Information Disclosure Statements (IDS's)

Applicants acknowledge receipt of initialed copies of the PTO-1449 forms submitted to the Office with the IDS submissions mailed May 8, 2002 and November 25, 2002.

Applicants respectfully request initialed copies of the PTO-1449 forms submitted to the Office with the IDS submissions mailed May 6, 2003 (received by the Office May 9, 2003) and August 19, 2003 (received by the Office August 22, 2003).

Election/Restriction

Claims 51-54 have been cancelled as being directed to a non-elected invention and Claims 47-50 have been withdrawn as being directed to a non-elected species.

Double Patenting

Claims 1-46 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-83 of copending Application No. 10/074,563. Applicants will consider submitting a terminal disclaimer when the Office has indicated that the instant claims are otherwise in condition for allowance, but would prefer to avoid the costs of submitting that terminal disclaimer until such time as it becomes necessary.

Claim Rejections - 35 U.S.C. § 102(b)

Claims 1-5, 14, 20, 21, 27, 28, 30, 33-35 and 42 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Ikoma et al., Growth of Si/3C-SiC/Si(100) heterostructures by pulsed supersonic free jets, Applied Physics Letters, 75(25) 3977-3979 (December 1999) (“Ikoma”). Applicants respectfully traverse this rejection.

The Office has taken the position that Ikoma discloses all the limitations recited in Claims 1-5, 14, 20, 21, 27, 28, 30, 33-35 and 42. Applicants disagree, but to facilitate timely prosecution, Claims 1 and 27 have been amended as set forth above to recite a substrate having a surface area of about 300 cm² or greater. In contrast, Ikoma discloses much smaller 25 X 25 mm² substrates, see p. 3977, first column, third paragraph. Therefore, Applicants respectfully submit that Ikoma does not anticipate Claims 1-5, 14, 20, 21, 27, 28, 30, 33-35 and 42, and respectfully request reconsideration and withdrawal of the § 102(b) rejection of these claims.

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Applicants respectfully point out that Ikoma does not teach or suggest the claimed combination of limitations. Ikoma discloses deposition using pulsed supersonic free jets of methylsilane for SiC growth and trisilane for Si growth, see abstract at p. 3977. Ikoma at p. 3977 (see column 2, first paragraph) indicates that the methylsilane and trisilane gases are introduced into the CVD chamber using a General Valve with a nozzle diameter of 0.8 mm, and the distance between the substrate and valve is 20 cm. Ikoma discloses cutting Si(100) wafers into 25 X 25 mm² pieces before cleaning and introduction into the chamber.

It is apparent that the deposition apparatus disclosed in Ikoma is a laboratory-scale pulsed supersonic free jet with a relatively small nozzle diameter and relatively short distance between the substrate and valve that only allows deposition on relatively small substrates, as evidenced by the 25 X 25 mm² substrates disclosed by Ikoma. It is unlikely that Ikoma would have gone to the trouble of cutting the Si(100) wafer into pieces unless the technique and/or apparatus was unsuited to larger substrates. It is Applicants' understanding that such pulsed supersonic free jets are not used in commercial practice, at least in part because of their inability to deposit commercially acceptable films over larger surface area substrates. Thus, there is no motivation to modify Ikoma to meet the instantly claimed combination of limitations, including a substrate having a surface area of about 300 cm² or greater. Therefore, Applicants respectfully submit that the instant claims are nonobvious in view of Ikoma.

Claim Rejections - 35 U.S.C. § 103(a)

Claims 6-8 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ikoma in view of U.S. Patent No. 5,698,771 ("Shields"). Applicants respectfully traverse this rejection.

The Office notes that Ikoma does not disclose depositing a Si-containing film directly onto a dielectric material, but states that Shields discloses depositing a Si-containing film (17) directly onto a dielectric material (16) (see Shields Fig. 1) during the formation of a gate electrode. The Office then takes the position that it would have been obvious to one having ordinary skill in the art at the time Applicants' invention was made to have used the dielectric material of Shields as the substrate in Ikoma in order to form a gate electrode.

Applicants respectfully disagree, but to facilitate timely prosecution, Claim 1 has been amended as set forth above to recite a substrate having a surface area of about 300 cm² or greater.

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Applicants respectfully submit that there is no teaching or suggestion in Ikoma or Shields to modify Ikoma to meet the instantly claimed combination of limitations, including a substrate having a surface area of about 300 cm² or greater. Shields discloses at col. 4, lines 59-65 that the device shown in Figure 1 is formed “using conventional methods of semiconductor fabrication”, citing to a reference having a publication date of 1992. However, Ikoma at page 3977 (column 1, third paragraph) refers to references 9 and 11 for details of the deposition chamber. Since Ikoma references 9 and 11 were published much later than 1992 (1998 and 1999, respectively, see Ikoma at p. 3979), there is no indication that Shields considered the pulsed supersonic free jets of Ikoma to be a conventional method of semiconductor fabrication. Thus, Shields provides no motivation to modify Ikoma to meet the instantly claimed combination of limitations. In addition, there is no reasonable expectation of success, because it is Applicants’ understanding that such pulsed supersonic free jets are not used in commercial practice, at least in part because of their inability to deposit commercially acceptable films over larger surface area substrates.

Therefore, Applicants respectfully request reconsideration and withdrawal of the rejection of Claims 6-8 under § 103(a) as being unpatentable over Ikoma in view of Shields.

Claims 9 and 36 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ikoma in view of U.S. Patent No. 6,455,892 (“Okuno”). Applicants respectfully traverse this rejection.

The Office notes that Ikoma does not disclose depositing an oxide layer onto the Si-containing film, but states that Okuno discloses depositing an oxide layer (7) directly onto the Si-containing film during the formation of a gate oxide film, as indicated in Okuno Figure 1. The Office then takes the position that it would have been obvious to one having ordinary skill in the art at the time Applicants’ invention was made to have deposited an oxide layer as taught by Okuno onto the Si-containing film of Ikoma in order to form a gate insulating layer during fabrication of a semiconductor device.

Applicants respectfully disagree. As an initial matter, Applicants note that Okuno discloses forming the gate oxide film 7 on the substrate by wet oxidation, not by depositing, see Okuno column 6, lines 54-56. However, to the extent that wet oxidation is considered equivalent to depositing, Applicants respectfully point out that Claims 1 and 27 (from which Claims 9 and 36 ultimately depend, respectively) have been amended as set forth above to recite a substrate

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having a surface area of about 300 cm² or greater. Applicants respectfully submit that there is no teaching or suggestion in Ikoma or Okuno to modify Ikoma to meet the instantly claimed combination of limitations, including a substrate having a surface area of about 300 cm² or greater. In particular, Okuno neither teaches nor suggests conducting the disclosed process using a laboratory-scale pulsed supersonic free jet such as that disclosed in Ikoma. Therefore, Applicants respectfully request reconsideration and withdrawal of the rejection of Claims 9 and 36 under § 103(a) as being unpatentable over Ikoma in view of Okuno.

Conclusion

Applicants respectfully submit that this application is in condition for allowance, early notification of which would be appreciated. The Office is respectfully invited to contact the undersigned at the telephone number provided below with any questions regarding this application.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: 12/2/03

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